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ABSTRACT

This study investigated the relationships obtained among verbal imitation, comprehension, and production when a stimulus sentence exceeded the child's short term memory. A total of 32 children, aged 3 to 5 years, took tests of comprehension, nonverbal imitation, verbal imitation, and production of structures expressing sequence ("before", "after", "first", etc.) and simultaneity ("while", "at the same time" etc.). Scores on the nonverbal imitation of both sequence and simultaneity were significantly higher than scores on comprehension, verbal imitation, and production. In addition, there was a significant interaction between temporal construction and task. Scores on the comprehension of both sequence and simultaneity were found to be significantly higher than on production. The significance of these data are discussed in detail; and an argument is made for a multi-instrumental approach to the study of language acquisition. (ED)

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Children's Verbal Imitation, Comprehension and Production of Temporal Structures

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Paper presented at the Biennial Meeting of the Society for Research in Child Development, April 10-13, 1975, Denver

Children's Verbal Imitation, Comprehension, and Production of Temporal Structures [1,2]

Recent psycholinguistic research contains numerous reports of children's comprehension, verbal imitation and production of syntactic structures. Finding children's scores on verbal imitation higher than on either comprehension or production, Fraser, Bellugi and Brown (1963) concluded that verbal imitation makes fewer demands on the child's cognitive abilities than does either comprehension or production.

This conclusion has been criticized by Menyuk (1971) who found that children verbally imitated ungrammatical sentences grammatically, suggesting that imitation seems to rely on prior knowledge of the structures and relations to be imitated.

In a related study Slobin and Welsh (1967) found that a two year old was able to imitate both meaningful and anomalous sentences within the limits of her short term memory. On the other hand, she could imitate neither meaningful nor anomalous sentences if they exceeded auditory memory.

Taken together these studies raise the question: If a stimulus sentence exceeds the child's short term memory, what relationships will obtain among verbal imitation, comprehension and production? The first hypothesis of the present study was that once a sentence exceeds the child's auditory memory, scores on comprehension will exceed scores on both verbal imitation and production.

A different issue, raised by all three studies, relates to the concentration on syntactic rather than semantic phenomena. It is not clear whether the distribution of results reported in the preceding investigations

would have obtained under stimulus conditions with semantically varied items. For example, would Fraser, Bellugi and Brown have found scores on verbal imitation higher than on comprehension if items from one semantic domain had been used. To explore this question, structures expressing the sequence and simultaneity of two spatially distinct events were investigated.

While the literature contains a number of studies of the acquisition of linguistic structures expressing sequence (Clark, 1971; Johnson, 1975; Amidon and Carey, 1972; and Barrie-Blackley, 1973) studies of both sequence and simultaneity are infrequent (Clark, 1970; Feagans, 1974).

Clark reports that children acquire simultaneity prior to sequence. However, she operationalized simultaneity as 'time at which X'. In that view the children's use of today and now marks simultaneity. Two different events are not temporally related; rather one event is marked in time. The present investigation, on the other hand, considers the acquisition of simultaneity in terms of the child's ability to relate two spatially distinct events. In this sense, simultaneity is 'time at which both X and Y'.

It was hypothesized that sequence would precede simultaneity in language acquisition due to cognitive constraints on the child. For example, Piaget (1969) found children unable to determine that two different events ceased simultaneously because the events were not identical. Apparently "children conceive of time as the complete course of a single action, and not as the relation between, or common frame of, different actions..." (Piaget, 1969, p. 134).

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Method

Thirty-two children from 3 to 5 years were tested for their comprehension, non-verbal imitation, verbal imitation and production of structures expressing sequence and simultaneity. The mean age per group in years and months was:

Group	I	3;2
	II	4;0
	III	4;5
	IV	4;10

Each group consisted of 4 males and 4 females.

On the Non-Verbal Imitation Test E acted out either sequential or simultaneous events and S had to copy E's actions. On the Comprehension Test E read a list of sentences and S was asked to act out the sentences. On the Verbal Imitation Test E read a list of sentences and S had to repeat them. On the Production Test E acted out either sequential or simultaneous events and asked S when one of the events occurred.

A 2 x 2 factorial design for stimulus and response tasks was used. The first factor, stimulus mode, was either verbal or non-verbal. The second factor, response mode, was also either verbal or non-verbal. The four tasks are represented in Figure 1. The tasks were within subject and were presented in varying order according to a Latin Square design.

Sentences expressing sequence included the following constructions: before, after, first, last and and then. Sentences expressing simultaneity included while and at the same time. The stimulus constructions and an example of each appear in Table 1.

Results

A two way analysis of variance (order of presentation x task) revealed no main effect for order of presentation, $F(3, 28) = .18$ so order was eliminated from subsequent analyses.

A three-way analysis of variance (temporal construction x age x task) revealed a highly significant main effect for task, $F(3, 84) = 34.7, p < .001$. The percent correct by age for each task appears in Table 2. The effect for age was also reliable at .005 ($F(3, 28) = 15.1$) as was the effect for temporal construction, $F(1, 28) = 43.6$, $p < .001$, with scores on sequence significantly higher than scores on simultaneity.

On the t tests comparing pairs of tasks, scores on the non-verbal imitation of both sequence and simultaneity were significantly higher than scores on comprehension, verbal imitation and production. In addition, there was a significant interaction between temporal construction and task, $F(3, 84) = 5.41$, $p < .01$. This appears in Figure 2. For sequential constructions comprehension was significantly easier than both verbal imitation and production; for constructions expressing simultaneity comprehension scores were significantly higher than those on production; however the differences between comprehension and verbal imitation and verbal imitation and production were not significant. T tests between the pairs of tasks within sequence and within simultaneity appear in Table 3.

Discussion

The fact that scores on the comprehension of both sequence and simultaneity were significantly higher than on production indicates that children may know more about their language than their elicited productions

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indicate (Leopold, 1949; Fraser, Bellugi and Brown, 1963; Turner and Rommetveit, 1967). However, it is also argued that comprehension is not complete before production begins. In no instance in the present study did a child perform without error in comprehension and yet fail every question in production. That is, although the comprehension data were significantly above the production data, there was evidence of productive use of some temporal connectives. This would suggest that some degree of comprehension is in advance of production skills as they were operationalized in this study. These results are supported by Ferreiro(1971).

The significant difference between the comprehension and verbal imitation of sequence suggests that verbal imitations include the processing and recoding of stimulus material. The form of the children's imitations across age also support this claim. For example, in the younger groups while was frequently omitted or imitated as and. Later children imitated while as before or after. Finally in the oldest group children substituted when in place of while. These imitation data are reported more extensively in Keller-Cohen(1974). It would appear that once a stimulus sentence exceeds the child's auditory memory, as in the present investigation, imitations deform the sentence in agreement with the child's linguistic system.

The lack of significant difference in the Verbal Imitation-Production t tests suggests that the processes involved in each may not be as dissimilar as had previously been thought. Apparently verbal imitation and production not only require at least partial knowledge of the referential distinctions expressed in language, but also require that the child be able to encode the distinctions for productive purposes. This relationship

between imitation and production finds support in Bloom, Hood and Lightbown (1974). They report a developmental shift from spontaneous imitation to spontaneous production in children who tended to spontaneously imitate the speech of others. In a related study Maratsos and Kuczaj (in preparation, cited in Maratsos and Kuczaj, 1974) found that their subject's competence in elicited imitation generally did not surpass his spontaneous productions. This further suggests a closer relationship between elicited imitation and spontaneous production.

The data from the present investigation also support the hypothesis that sequence precedes simultaneity in language acquisition when we speak of non-identical events. However, when a semantic distinction is in the early stages of acquisition, as in the case of the simultaneity of non-identical events, significant differences between verbal imitation, comprehension and production should not be present. The lack of significant difference between the CVI and VIP t tests on simultaneity in this study reflects this.

Before concluding, the data presented here ought to be evaluated in light of the limitations of each test. A production test of the type used in the present study enables us to discover what temporal structure a child does use in 'elicited' production. However, one cannot tell from these data what meaning the child assigns to the temporal descriptions used, i.e, we cannot be certain what functional and referential features the child has encoded for the responses given or whether the child understands the response he gives.

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The comprehension test permits some inferences about what the child does or does not understand. Nevertheless, although a child may act out the stimulus sentences correctly, he may do so for the wrong reasons. For example, one four year old subject tended to act out the second clause first. This lowered his scores on Simple Sequentiality where the clauses must be acted out in their order of mention; Scores on Reverse Sequentiality were consequently elevated since the clauses were correctly acted out in reverse of their order of mention.

Another limitation of comprehension tests is that while we may be able to discover what a child seems to or fails to understand, we do not know what meaning the child has assigned to a particular lexical structure.

A verbal imitation test is more useful in this latter respect. As discussed earlier in this paper, the form of the verbal imitation provides information about the hypotheses the child makes with respect to word meaning. One problem with the task of verbal imitation is that some children are clearly more proficient at imitating, hence producing responses that are far beyond their comprehension. One three and one-half year old imitated every stimulus sentence correctly yet she performed like children of the same age on the comprehension test.

While further investigation into the relationships among these processes is still needed, the evidence presented here argues for a multi-instrumental approach to the study of language acquisition. The complementary nature of these processes requires this.

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Footnotes

[1] I appreciate Jack Upshur reading an earlier version of this paper.

[2] A portion of the work reported here was part of a 1974 doctoral dissertation submitted to the State University of New York at Buffalo, Dept. of Linguistics.

[3] In my dialect of English, the past tence of pet has a zero allomorph.

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Figure 1

STIMULUS	RESPONSE: Verbal	RESPONSE: Non-Verbal
Verbal	Verbal Imitation	Comprehension
Non-Verbal	Production	Non-Verbal Imitation

Table 1

Stimulus Constructions

Simple Sequentiality: where the clause order is the same as the temporal order

1) C_1 before C_2 — The girl pet the mouse before the boy kicked the car.

2) After C_1C_2. — After the boy hopped over the dog, the girl pushed the cat.

3) First C_1. Last C_2. — First the girl pushed the mouse. Last the boy kicked the car.

4) C_1 and then C_2. — The boy hopped over the shoe and then the girl pushed the dog.

Reverse Sequentiality: where the clause order is the reverse of the temporal order

5) Before C_2C_1. — Before the girl hit the cat the boy jumped over the cup.

6) C_2 after C_1. — The boy pushed the box after the girl threw the flower..

Simultaneity: where the clause order does not correspond in any way to the temporal order

7) C_1 and C_2 at the same time. — The girl hopped over the cup and the boy pushed the cat at the same time.

8) C_1 while C_2. — The boy kissed the elephant while the girl pulled the car.

Table 2

Percentage of Correct Responses by Age Group on Each Task

Age Group	Non-Verbal Imitation	Verbal Imitation	Comprehension	Production
I	48	8	24	4
II	73	28	45	13
III	83	36	48	28
IV	88	64	73	62

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Figure 2

Time x Task Interaction

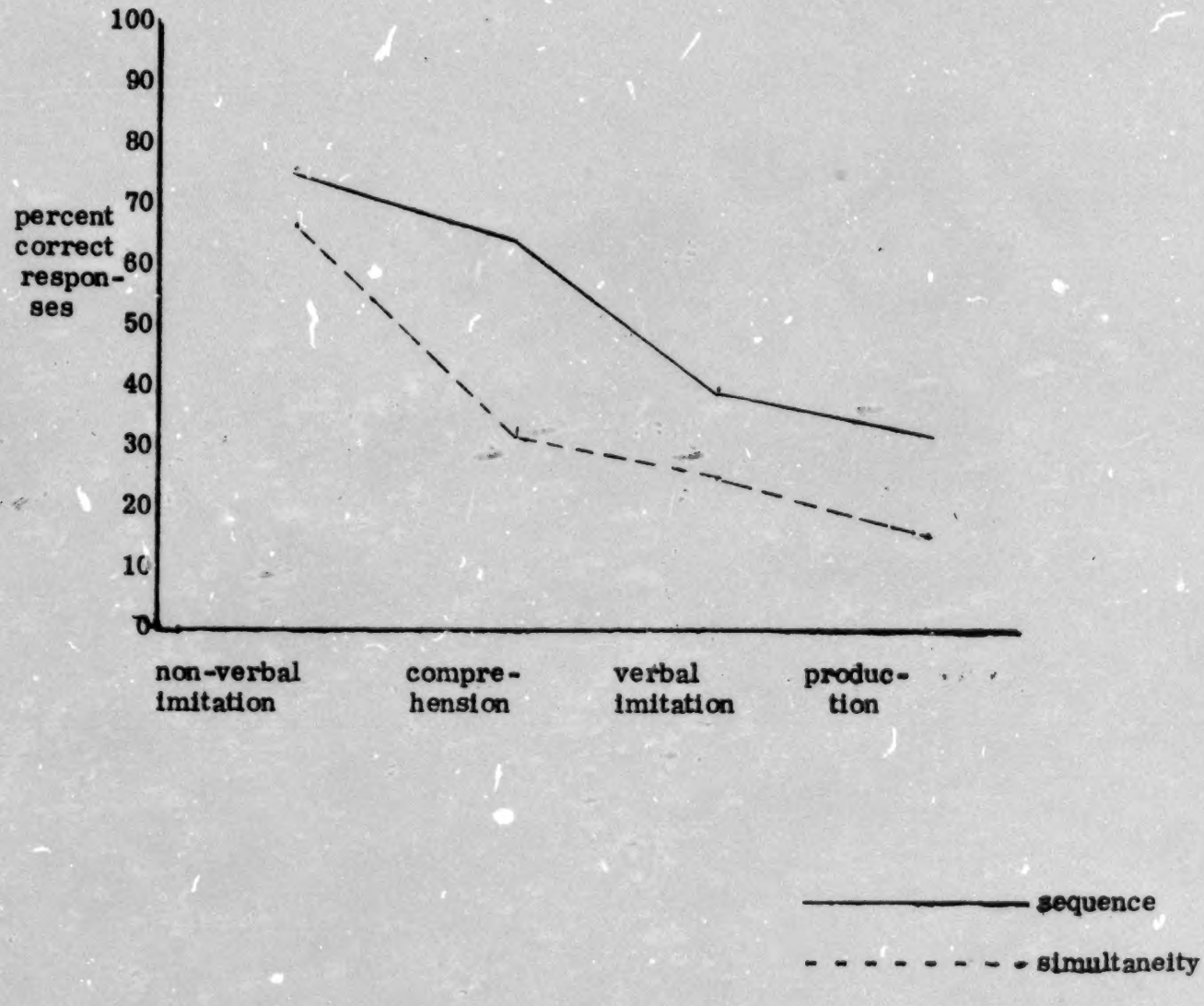

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Table 3

T Tests between Pairs of Tasks

for Sequence and Simultaneity[1]

Sequence			
Comprehension and Production (CP)	t (31) = 6.22	p <.001	(two tailed)
Comprehension and Verbal Imitation (CVI)	t (31) = 4.98	p <.001	
Verbal Imitation and Production (VIP)	t (31) = .75	ns	
Simultaneity			
Comprehension and Production (CP)	t (31) = 2.75	p <.01	
Comprehension and Verbal Imitation (CVI)	t (31) = 1.00	ns	
Verbal Imitation and Production (VIP)	t (31) = 1.11	ns	

[1]Scores on Non-Verbal Imitation were significantly higher than scores on Verbal Imitation, Comprehension and Production

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